

**M.Sc. DEGREE (5 YEAR INTEGRATED) I SEMESTER EXAMINATION IN PHOTONICS,  
NOVEMBER 2009**

**CEL 1102 ELECTRICITY AND MAGNETISM  
(New Scheme)**

Time : 3 Hours

Maximum Marks : 50

**PART - A**

*(Answer any **FIVE** questions)  
(All questions carry **EQUAL** marks)*

(5 x 2 = 10)

- I. (a) Distinguish between dia, para and ferromagnetic materials.  
 (b) Explain the use of choke in an AC circuit.  
 (c) Explain acceptor and rejecter circuits.  
 (d) What are the sources of power loss in a conventional transformer?  
 (e) State and explain the maximum power transfer theorem.  
 (f) What is meant by wattles current?  
 (g) Define Hall effect.  
 (h) Explain Faraday's laws of electromagnetic induction.

**PART - B**

*(All questions carry **EQUAL** marks)*

(4 x 10 = 40)

- II. A. (a) Describe Millikan's oil drop experiment to determine the charge of an electron.  
 (b) Derive an expression for the electric field at a point due to an electric dipole.

**OR**

- B. (a) Derive an expression for the electric field at a point on the axis of a uniformly charged disc.  
 (b) State and derive Gauss's law in electrostatics.  
 (c) Explain Coulomb's law.

- III. A. (a) Derive the expression for the capacitance of a parallel plate capacitor with a dielectric between the plates.  
 (b) What are equipotential surfaces?  
 (c) Derive the expression for the energy of a charged capacitor.

**OR**

- B. (a) Explain with figure the working of a Van de Graff Generator.  
 (b) Derive the expression for the electric potential at a point due to a group of point charges.  
 (c) Explain Ohm's law.

- IV. A. (a) Explain the magnetic elements of the earth.  
 (b) Explain Lenz's law.  
 (c) Explain Ampere's circuital law.

**OR**

- B. (a) Derive the expression for the magnetic force on a current carrying conductor.  
 (b) Derive an expression for the intensity of field on the axis of a solenoid.

- V. A. (a) Give the theory of an AC circuit containing L, C and R in series. Find out the impedance and condition for resonance. What is the Q factor?  
 (b) Describe the construction and working of a ballistic galvanometer.

**OR**

- B. (a) Explain AC and DC generators.  
 (b) What is a tank circuit?  
 (c) A  $100 \mu\text{F}$  capacitor in series with a  $40 \Omega$  resistance is connected to 110V, 60 Hz. Supply. Find out maximum current in the circuit and time lag between current maximum and voltage maximum.

